

THE NATIONAL ACADEMIES

DOCKET FILE COPY ORIGINAL

Advisers to the Nation on Science, Engineering, and Medicine

National Academy of Sciences
National Academy of Engineering
Institute of Medicine
National Research Council

April 26, 2000

Ms. Magalie Roman Salas, Esq.
Secretary
Federal Communications Commission
(Delivered to TW-A325, 12th Street lobby)
The Portals
445 Twelfth Street, SW
Washington, D.C. 20554

RECEIVED
APR 26 2000
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554


In the Matter of)	
)	
The 4.9 GHz Band Transferred from)	WT Docket No. 00-32
Federal Government Use)	

Dear Ms. Salas:

Transmitted herewith by the National Academies, through the Committee on Radio Frequencies of the National Research Council, are an original and five copies of its Comments in the above-referenced proceedings.

If additional information is required concerning this matter, please communicate with this office.

Sincerely yours,



Robert L. Riemer
Senior Program Officer

cc: Members of CORF
Mr. Paul J. Feldman
Dr. Tomas Gergely
Dr. Donald C. Shapero

No. of Copies rec'd 075
List ABCDE

Board on Physics and Astronomy

2101 Constitution Avenue, NW, Washington, DC 20418

Telephone (202) 334 3520 Fax (202) 334 3575 Email bpa@nas.edu national-academies.org/bpa

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of)	
)	
The 4.9 GHz Band Transferred from)	WT Docket No. 00-32
Federal Government Use)	

COMMENTS OF THE
NATIONAL ACADEMY OF SCIENCES'
COMMITTEE ON RADIO FREQUENCIES

The National Academy of Sciences, through the National Research Council's Committee on Radio Frequencies¹ (hereinafter, CORF), hereby submits its comments in response to the Commission's February 26, 2000, Notice of Proposed Rulemaking in the above-captioned docket (NPRM). In these Comments, CORF generally supports the Commission's proposal for re-allocation of the 4940-4990 MHz band. In addition, pursuant to paragraph 18 of the Notice, CORF provides updated information on radio astronomy observatories for the proposed new Footnote US311.

I. Introduction: The Importance of the Radio Astronomy Service (RAS) and Earth-Exploration Satellite Service (EESS) Observations in the 4.9 GHz Band and the Unique Vulnerability of Passive Services to Out-of-Band and Spurious Emissions.

CORF has a substantial interest in this proceeding, because it represents the interests of the scientific users of the radio spectrum, including users of the RAS and EESS bands. Both RAS and EESS observers perform important yet vulnerable scientific research.

As the Commission has long recognized, radio astronomy is a key tool used by scientists to study our universe. Through the use of radio astronomy, scientists have in recent years discovered the first planets outside the solar system, circling a distant pulsar. Measurements of radio spectral line emission have identified and characterized the birth sites of stars in our own Galaxy, and the complex distribution and evolution of galaxies in the universe. Radio astronomy measurements have discovered ripples in the cosmic microwave background, generated in the early universe, which later formed the stars and galaxies we know today. Observations of supernovas have witnessed the creation and distribution of heavy elements essential to the formation of planets like Earth, and of life itself.

¹ A roster of the committee membership is attached.

The EESS represents both a critical and a unique resource for monitoring the global atmospheric and surface state, operationally and experimentally. Both passive and active satellite-based microwave remote sensing represents the only practical means of obtaining uniform-quality atmospheric and surface data encompassing the most remote oceans as well as densely populated areas of Earth. EESS data has contributed substantially to the study of meteorology, atmospheric chemistry, oceanography, and global change. Currently, instruments operating in the EESS bands provide regular and reliable quantitative atmospheric, oceanic, and land measurements to support an extensive variety of scientific, commercial, and government (civil and military) data users. Applications of the data include aviation forecasts, hurricane and severe storm warning and tracking, seasonal and interannual climate forecasts, decadal-scale monitoring of climate variability, medium-range forecasting, and studies of the ocean surface and internal structure, as well as many others.

These current benefits of scientific research, obtained through years of work and substantial federal investment, as well as future benefits, must be protected.

As passive users of the spectrum, radio astronomers and Earth scientists have no control over the frequencies that they must observe or over the character of the “transmitted” signal. These parameters are set by the laws of nature. Furthermore, the emissions that radio astronomers receive are extremely weak—a typical radio telescope receives only about one-trillionth of a watt from even the strongest cosmic source. Because radio astronomy receivers are designed to pick up such remarkably weak signals, such facilities are therefore particularly vulnerable to interference from spurious and out-of-band emissions from licensed and unlicensed users of neighboring bands, and those that produce harmonic emissions that fall into the RAS bands. Similarly, the emissions received by passive EESS radiometers in Earth orbit are weak by comparison with emissions from other services.

Of particular concern in this proceeding is protection of RAS and EESS observations in the 4.9 GHz band. The Notice (paras. 13-15) properly noted the Footnote protection given to the Radio Astronomy Service, Earth Exploration Satellite Service, and Space Research Service in this band. This band is important to passive scientific users. For example, as set forth in the Notice, radio astronomy observations in the sub-band 4950-4990 MHz band are extremely useful in studying the brightness distributions of galactic and extra-galactic objects such as ionized hydrogen clouds and supernova remnants. Such observations allow scientists to construct detailed maps of such phenomena, to understand their structures and dynamics, and to derive physical parameters from the sources, such as their total masses.

The sub-band 4950 - 4990 MHz has been shown to be useful for sensing ocean surface salinity using microwave radiometers. This band has also been used for remote sensing of other ocean and land surface parameters including sea surface temperature and soil moisture. In addition, the use of the 4940-4990 MHz band by a non-U.S. EESS spaceborne sensor is expected to begin shortly. U.S. airborne scientific radiometers also employ this band to perform research over oceans and land. Therefore, the 4950 to 4990 MHz band should be protected at the levels given for shared bands in Recommendation ITU-R SA.1029-1, in view of both its current and imminent use, and its potential future use.

II. CORF Supports the Commission's Proposed Re-allocation and Supplies Information Regarding RAS Use of the Band.

CORF believes that the re-allocation proposed in the Notice would serve the public interest, conditioned on retention of the proposed prohibition of aeronautical mobile service use in the band. Such aeronautical use could be destructive to scientific observations.

CORF also supports the proposed deletion of Footnote US257 and addition of the 4950-4990 MHz band to Footnote US311. Furthermore, pursuant to the request of the National Science Foundation, set forth in para. 18 of the Notice, CORF hereby assists the Commission in updating the information currently in Footnote US311 regarding radio astronomy observatories making observations in the 1350-1400 and 4950-4990 MHz bands. Each of the observatories currently listed in that Footnote should be retained, and those others currently listed in Footnote US257 should be included in the revised Footnote US311—namely, Hat Creek Observatory, Hat Creek California, and Owens Valley Radio Observatory, Big Pine, California (with both of the locations listed in US257). In addition, the two observatories listed below should be included in the revised Footnote US311 with an 80-kilometer (50-mile) protection radius centered around the latitude and longitude shown below. The observatories listed are institutionally operated and continuously supported, and perform scientific research in the noted bands.

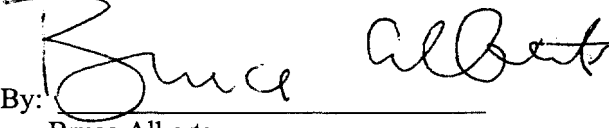
	Latitude	Longitude
Woodbury Research Facility, Georgia Institute of Technology, Woodbury, Georgia	32° 56 N	84° 32 W
Morehead Radio Telescope, Morehead State University, Morehead, Kentucky	38° 11 N	83° 26 W

III. Conclusion

CORF supports the Commission's proposals in this proceeding, conditioned on the prohibition of aeronautical mobile uses in this band. Footnote US311 should be modified with the updated information attached hereto.

Respectfully submitted,

COMMITTEE ON RADIO FREQUENCIES

By: 
Bruce Alberts
President
National Academy of Sciences

April 26, 2000

Direct correspondence to:
Paul J. Feldman, Esq.
Fletcher, Heald & Hildreth, PLC
1300 North 17th Street
11th Floor
Rosslyn, VA 22209
(703) 812-0400

With a copy to:
Dr. Robert L. Riemer
HA-562
National Research Council
2101 Constitution Ave., NW
Washington, D.C. 20418
(202) 334-3520

THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

National Academy of Sciences
National Academy of Engineering
Institute of Medicine
National Research Council

COMMITTEE ON RADIO FREQUENCIES

Terms expire at the end of the month and year indicated.

Paul Steffes, **Chair** 6/01
School of Electrical and Computer Engineering
Georgia Institute of Technology
Atlanta, GA 30332-0250
Phone: 404-894-3128
Fax: 404-894-5935 or 4641
Email: ps11@prism.gatech.edu

Darrel Emerson 6/02
National Radio Astronomy Observatory-
Tucson
Campus Building 65
949 N. Cherry Ave.
Tucson, AZ 85721
Phone: 520-882-8250
Fax: 520-882-7955
Email: demerson@nrao.edu

Charles C. Eriksen 6/02
School of Oceanography
University of Washington
Box 357940
Seattle WA 98195-7940
Phone: 206-543-6528
Fax: 206-685-3354
Email: charlie@ocean.washington.edu

Michael J. Klein 6/02
Jet Propulsion Laboratory, 303-402
4800 Oak Grove Dr.
Pasadena, CA 91109-8099
Phone: 818-354-7132
Email: michael.j.klein@jpl.nasa.gov

Thomas Kuiper 6/01
Jet Propulsion Laboratory, 169-506
4800 Oak Grove Drive
Pasadena, CA 91109-8099
Phone: 818-354-5623
Fax: 818-354-8895
Email: kuiper@jpl.nasa.gov

David B. Kunkee 6/02
The Aerospace Corporation
P.O. Box 92957
2350 E. El Segundo Blvd.
El Segundo, CA 90245-4691
Phone: 310-336-1125
Fax: 310-563-1132
Email: david.b.kunkee@notes.aero.org

Mark McKinnon 6/00
National Radio Astronomy Observatory-
Green Bank
P.O. Box 2
Green Bank, WV 24944
Phone: 304-456-2212
Fax: 304-456-2170
Email: mmckinno@nrao.edu

Ram M. Narayanan 6/00
Department of Electrical Engineering
242N, WSEC
University of Nebraska-Lincoln
Lincoln, NE 68588-0511
Phone: 402-472-5141
Fax: 402-472-4732
Email: rnarayanan@unl.edu

Karen M. St. Germain 6/02
Remote Sensing Division, Code 7223
Naval Research Laboratory
4555 Overlook Avenue, SW
Washington, DC 20375
Phone: 202-767-3443
Fax: 202-767-9194
Email: karen.stgermain@nrl.navy.mil

Board on Physics and Astronomy

2101 Constitution Avenue, NW, Washington, DC 20418
Telephone (202) 334 3520 Fax (202) 334 3575 Email bpa@nas.edu national-academies.org/bpa

NRC Staff

Donald C. Shapero, Director
Email: dshapero@nas.edu

Robert L. Riemer, Associate Director
Email: rriemer@nas.edu

Board on Physics and Astronomy
The National Academies
2101 Constitution Avenue
Washington, DC 20418
Phone: 202-334-3520
Fax: 202-334-3575
Email: bpa@nas.edu

Consultants

Paul Feldman
Attorney at Law
Fletcher, Heald and Hildreth
11th Floor
1300 North 17th Street
Rosslyn, VA 22209
Phone: 703-812-0400
Fax: 703-812-0486
Email: feldman@fhh-telcomlaw.com

John Kiebler
14520 Dowling Drive
Burtonsville, MD 20866
Phone: 301-384-9615
Fax: 301-901-9207
Email: jkiebler@cpcug.org

A. Richard Thompson
National Radio Astronomy Observatory
520 Edgemont Road
Charlottesville, VA 22903
Phone: 804-296-0285
Fax: 804-296-0278
Email: athompso@nrao.edu